Studies on the pollen morphology of some *Capparis* L. (Capparaceae) species*

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Abstract. Pollen morphology of seven species of *Capparis* L., has been studied using light microscope and scanning electron microscope. Ultra surface patterns coupled with endocolpium characters of pollen grains are useful for distinguishing the species.

Keywords. Pollen morphology; *Capparis*; Capparaceae.

1. Introduction

*Capparis* L. is a genus of family Capparaceae, distributed in the warm climates of the world, and with a representation of 31 species in India (Hooker 1875), occurring as trees, decumbent or erect shrubs, or woody climbers. The genus is characterised by tetramerous flowers having numerous stamens borne at the base of a gynophore. Ovary is bicarpellary, syncarpous and superior with parietal placentation. In taxonomic treatmets of plant taxa, the pollen morphology plays an important role at various taxonomic levels as meted out in several publications on pollen morphology. Erdtman (1952) discussed taxonomic affinities of the family but did not mention the genus *Capparis*. Guinet (1962) studied the pollen morphology of *C. stylosa* and reported that it has dimorphic pollen. Mitra (1970) described the pollen grains of twelve species of *Capparis* as colporoidate with obscure surface pattern. Huang (1972) studied two species *C. formosana* and *C. membranacea* and described the pollen grains as 3-colporate and finely reticulate, based on light microscopic studies. The present investigation pertains to the pollen morphological studies of seven species of *Capparis*, namely, *C. floribunda* Wight, *C. grandis* Linn. f., *C. multiflora* Hook. f. and Thoms, *C. pedunculosa* Wall., *C. sepia* L., *C. tenera* Dalz. and *C. zeylanica* L., based on both light microscope (LM) and scanning electron microscope (SEM). Among these species, *C. grandis* is a tree species, *C. floribunda*, *C. multiflora* and *C. tenera* are woody climbers, and *C. pedunculosa*, *C. sepia* and *C. zeylanica* are branched shrubs.

2. Material and methods

The polliniferous material has been procured from the Herbarium of the Botanical Survey of India, Western Circle, Poona. For light microscopic studies, pollen preparations have been made according to the acetolysis method suggested by

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Erdtman (1952). For scanning electron microscopic studies, acetolysed grains were transferred to absolute alcohol, mounted on stubs and coated with gold in a Sputter coater. The scanning photomicrographs were taken in a scanning electron microscope (JEOL JSM 35c).

3. Observations

Pollen grains of various species of *Capparis*, as observed under light microscope (LM) and scanning electron microscope (SEM) are described below:

*C. floribunda* Wight: Pollen grains 3-zonocolporate, size 17.5 × 14.8 μm (16-19 × 13-15 μm), subprolate. Colpus long, ends acute, membrane crustate. Endocolpium faint, more or less circular, 3-4 μm, marked by a densely crustate area. Apocolpium diameter 3 μm. Exine thickness 1 μm, tectate, ectexine thicker than endexine, columellae distinct, surface reticulate both in LM and SEM (figure 1).

*C. grandis* Linn. f.: Pollen grains 3-zonocolporate, size 19.45 × 14.7 μm (18-20 × 14-15 μm), subprolate. Colpus long, margin incrassate, ends acute, membrane crustate. Endocolpium faint, square marked by a crustate area, diameter 3, 4, or 5 μm. Apocolpium diameter 2.6 μm. Exine thickness 1-1.5 μm, ectexine thicker than endexine, tectate, columellae distinct, surface pattern obscure, appearing almost psilate in LM. In SEM, exine surface striate (figure 2).

*C. multiflora* Hook. f. and Thoms.: Pollen grains 3-zonocolporate, size 19.2 × 17.5 μm (18-22 × 16-19 μm), prolate spheroidal. Colpus long, narrow, ends acute, membrane crustate. Endocolpium lalongate, provided with a row of granules (crustations; figure 10), size variable, range 1-3 × 4-5 μm. Apocolpium diameter 2.7 μm. Exine thickness 2 μm, ectexine thicker than endexine, tectate, columellae distinct; surface areolate in LM, granulate in SEM (figure 3).

*C. pedunculosa* Wall: Pollen grains 3-zonocolporate, size 20.6 × 16 μm (18-24 × 15-18 μm). Colpus long, ends acute, membrane faintly crustate. Endocolpium circular or square, area marked by prominent reticulate pattern (figures 5, 11) as seen under light microscope, 4-5 μm. Apocolpium diameter 2.8 μm. Exine thickness 2 μm, ectexine thicker than endexine, tectate, columellae distinct (figure 4); surface reticulate in LM and striate-reticulate in SEM (figure 6).

*C. sepiaria* L.: Pollen grains 3-zonocolporate, size 14.7 × 11 μm (14-16 × 11-13 μm), prolate. Colpus long, ends acute, membrane faintly crustate. Endocolpium faintly marked, circular, 3 μm. Apocolpium diameter 4 μm. Exine thickness 1 μm, tectate; surface psilate in LM and striate-punctate in SEM (figure 7).

*C. tenera* Dalz.: Pollen grains 3-zonocolporate, size 21.7 × 19 μm (20-24 × 17-21 μm), subprolate. Colpus long, ends rounded, membrane crustate. Endocolpium

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circular, 5-6 μm, area crustate, provided with granules (figure 12). Apocolpium diameter 3.4 μm. Exine thickness 1 μm, 2 μm in some grains, tectate; surface gulate in both LM and SEM (figure 8).

C. zeylanica L.: Pollen grains 3-zonocolporate, size 17 × 15 μm (15-18 × 14-16 μm), prolate spheroidal. Colpus long with rounded ends, membrane crustate. Endocolpium circular with wavy margin (figure 13) 4-5 μm. Apocolpium 2.4 μm. Exine thickness 2 μm, ectexine thicker than endexine, columellae distinct; surface granulate in LM and finely spinulate in SEM (figure 9).

4. Discussion

Pollen grains in the species of Capparis are 3-zonocolporate with distinguishing characters of endocolpium and exine surface pattern. Mitra (1970) studied pollen morphology of twelve species of Capparis which included C. grandis, C. sepiaria and C. zeylanica, and reported colporoidate pollen with obscure surface pattern in all. However, in the seven species now studied, the endocolpium is marked by an ornamented area in all except C. zeylanica in which the endocolpium area is devoid of any pattern and the margin is serrated. In C. grandis and C. sepiaria the endocolpium is not clearly distinguishable as the crustate area on it is not much different from the remaining colpus membrane. In C. multiflora, the endocolpium is elongate, a feature not found in other species. Also, it has a row of granules on it along its equatorial length. In C. tenera and C. pedunculosa, the endocolpium is basically circular and the area is marked by a granular pattern in the former and by a prominent reticulate pattern in the latter.

The pollen surface patterns of these species are not convincingly distinct under the light microscope. These species are more easily distinguishable on the basis of ultra surface patterns of pollen grains as seen in the scanning electron micrographs. Pollen surface is reticulate in C. floribunda, striate in C. grandis (psilate in LM), granulate (aerolate in LM) in C. multiflora, striate-reticulate (reticulate in LM) in C. pedunculosa, striate-punctate (psilate in LM) in C. sepiaria, rugulate in C. tenera, and spinulate (granulate in LM) in C. zeylanica. The two species C. grandis and C. sepiaria stand closer pollen morphologically with striate pattern in both and similar endocolpium character, but can be classified by the presence of punctate exine in the latter species. Besides, the two species are also separable on the basis of pollen size, the grains being bigger in C. grandis (19.45 × 14.7 μm) and smaller in C. sepiaria (14.7 × 11 μm). From the foregoing account it is apparent that pollen surface pattern in Capparis species provides an important character for taxonomic consideration, and a further investigation on the pollen morphology of the genus taking more species into consideration, will be helpful in reaching important conclusions on the classification of the genus.

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